April 1974

MEMORANDUM

The Chinese Market for Technology

Background

China is a large, mostly underdeveloped, country which has energetically raised industrial capacity and output from the small 1949 base. Even though striking gains have been made in production and technology, China remains 5 to 20 or more years behind modern industrial nations in the various branches of industry. China's machine builders do not have at their disposal plentiful amounts of off-the-shelf components, such as high pressure valves of special materials, all kinds of antifriction bearings, machine tools, electrical and electronic components, fasteners, and materials handling equipment, which are so well catalogued in modern industrial countries and available for immediate shipment.

For some industries, China can afford the time to develop a domestic capability with a minimum of expenditure for foreign hardware and "know how". In such cases the Chinese exchange technical delegations, study foreign literature, invite foreign experts to lecture in China, and sometimes buy a few key pieces of equipment to study and copy. When it has been necessary to establish a new production capability in a short time, the Chinese have been willing to purchase turnkey installations, for instance, the recent purchase of 13 large modern fertilizer plants from the US, Japan, and France.

Purchases of Industrial Plants

In 1973, China ordered $2.0 billion worth of machinery and equipment from non-Communist countries* including

* In the 1950s the Chinese relied exclusively on other Communist countries for aid in industrial development and two-thirds of its trade was with Bloc countries. After the withdrawal of Soviet technical support in 1960, the PRC turned to non-Communist supplies, and today four-fifths of its trade is with non-Communist nations.

$1.2 billion worth of complete plants. More than $1 billion were earmarked for petrochemical plants to produce fertilizer, synthetic fibers, plastics, resins, synthetic rubber, and other products. These purchases reflect Peking's decision to use foreign equipment and technology in support of agriculture and to provide essential consumer goods. To maintain the momentum of the drive for industrialization, sizeable amounts of equipment have been ordered for mineral extraction and processing and for the services sector. The Chinese have bought or are seeking equipment for iron and steel, non-ferrous metals, petroleum exploration, mining, all forms of transportation, electric power, and communications. So far, the anti-Confucius campaign has not inhibited China's efforts to obtain foreign technology. Beginning in 1973, Peking has shown much less reluctance to rely on foreign credits as a means of financing imports of equipment and technology.

In 1973-74 the Chinese have purchased 13 urea fertilizer plants together with associated ammonia plants. They also have bought a 16-plant petrochemical complex from France worth some $300 million and at least a dozen other petrochemical plants. The urea plants will increase urea output in China by 8 times over present levels, and synthetic fiber and plastic production will increase by several-fold when the petrochemical plants come on line. There are some indications the Chinese may purchase additional urea plants, as well as additional plants to produce fibers, resins, and plastics. Much of the plastics will be for use in agriculture.

Development of Fuels and Power

China wants to speed up development of its large petroleum reserves for domestic use and for export and has bought or is negotiating for the purchase of such equipment as seismic instruments, drill bits, offshore drilling platforms, well logging equipment, and blowout preventers and devices. The Chinese have also shown interest in oil well stimulation technology and in pipeline technology, such as pipelaying equipment, welding equipment, and tanker loading equipment. Gas compressors are also high on the import list.

China has huge deposits of coal and other minerals and can support an iron and steel industry as large as the US or Soviet industries. In recent years, the Chinese have been unable to open new mines fast enough to keep pace with needs. Peking is in the market for surface mining equipment such as stripping shovels, bulldozers, and large haulers. Underground mining equipment also is being ordered, especially for the coal industry. Such equipment includes long-wall mining machinery, drills and bits, cutting and hauling equipment, and bulk handling equipment.

China's power industry has suffered years of neglect. Especially needed is modern equipment to improve efficiency of generation and distribution. China makes steam generating units of 125 MW (megawatts) and has produced one or two 300 MW units; many more units are needed, including larger, more modern installations. The Chinese are negotiating for nuclear power technology in order to establish a domestic capability for future expansion in this field. They have purchased a dozen large gas turbine generators for handling peak loads and are negotiating for a number of others. In addition they hope to import a complete plant to manufacture industrial gas turbines. Domestic production of hydropower equipment, which is quite advanced in China, may be supplemented by occasional purchases of such specialized equipment as pump turbines for pump storage systems.

Support for Transportation Sector

All forms of transportation in China are coming in for increased priority. Large passenger aircraft, helicopters, and small airplanes are on the shopping list, as well as air traffic control systems. Heavy trucks, and diesel and electric locomotives have been purchased in large numbers in recent years. China is presently importing modern truck production equipment from the US, Japan, and Western Europe. Port facilities such as portal cranes and container handling equipment are much needed. The Chinese also are purchasing various types of cargo ships, including tankers, and are interested in improving their capabilities in naval shipbuilding.

Machine Tools and Metallurgy

The Chinese have the capability to produce adequate amounts of ordinary machine tools. Some specialized tools will be acquired through the purchase of complete plants. Individual purchases of special machine tools including a few numerically controlled tools are likely for specific projects or for familiarization and copying. China's anti-friction bearing technology is behind the world level; negotiations for ball bearing plants are in progress to reduce dependence on imports of bearings (more than $100 million worth were imported from 1965-73). Sizeable imports of industrial and scientific instruments will continue to be needed to maintain an acceptable rate of technological advance.

China's steel industry lags behind domestic requirements in both quality and assortment of products. China must spend large amounts of foreign exchange to import finished steel and alloy products. For more than a year, China has been actively negotiating with Japanese and West German consortiums for a large rolling mill complex worth about $400 million, and capable of processing about 3 million tons annually of hot rolled sheet, cold rolled sheet,

tin plate, galvanized sheet, and electrical steel. A contract with the Japanese consortium headed by Nippon Steel Corp. is near agreement for the largest part of the plant. China is still dependent on foreign built air separation plants to produce oxygen for steel making. Foreign technology for iron ore beneficiation is also needed.

As for nonferrous metals, the Chinese need additional plants to produce basic commodities such as aluminum, copper, lead, and zinc. They are in the market for technology to produce high-purity metals, especially titanium, tantalum, and magnesium. Other areas of interest include vacuum melting equipment and annealing furnaces, electric arc furnaces, forging equipment and carbon electrode technology.

Electronics

China is interested in complete plant and "know how" for making modern solid state electronic devices, particularly large scale integrated circuits. The Chinese computer industry is still small, producing about 100 medium scale computers annually which are limited in performance by inferior input-output equipment. China would like to acquire the technology to produce a few large scale computers and to mass produce mini-sized computers. China is only starting to establish a modern national telephone system and is a potential customer for carrier and switching equipment and the technology for its production. The Chinese are buying submarine cable technology and cable laying ships from Japan. They are presently engaged in negotiations with both Japanese and US firms for the purchase of complete plants to make picture tubes and receivers for color television.

Other Machinery

Spinning machinery for synthetic fibers and new technology for production of fibers and blends will be required to handle the large volume of output from the synthetic fiber plants being purchased. Machinery imported to improve traditional export products includes canning equipment, textile finishing equipment, and equipment to produce such packaging materials as linerboard, aluminum foil, and cellophane. China also may import technology to produce ball point pens and other items intended primarily for export. To improve paper making capabilities the Chinese are importing wood pulp plants and other machinery.

Reliance on Many Suppliers

Peking does not want to depend on a single large supplier for its industrial equipment and technology. The abrupt withdrawal of the Soviet technicians in 1960 was a costly blow, leaving China with many uncompleted plants as well as completed plants that could not be operated without Soviet

help. Thus Peking now deliberately spreads its orders among Japan, West Germany, France, the US (recently), and other leading industrial nations. The US has an advantage in the China market for various types of high-technology equipment -- civil aircraft, advanced computers, communications equipment, oil exploration and drilling equipment, and specialized machine tools. China's oft-stated goal is self-sufficiency in industry and technology; yet for the foreseeable future Peking must continue to rely heavily on Japan, Western Europe, and the US.

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